The role of ultrasound duplex in endovenous procedures

Neophytos A. Zambas MD, PhD
Vascular Surgeon
Polyclinic Ygia, Limassol, Cyprus
* Clinical examination & duplex ultrasound = best method
* The most effective and accurate tool
* Degree of leg swelling, skin changes, venous ulceration (CEAP Classification)
* DU of superficial, deep and perforator veins in the leg
* **Proximal vein pathologies:**
  * CT venography / MR venography for above inguinal ligament anatomic definition
  * Intravascular u/s for iliac vein stenosis – iliac vein stent procedures
* Accredited vascular lab
* Appropriate equipment and personnel
* Validated standardized diagnostic protocols
DU Equipment

* More sophisticated – high end, equipment in a vascular lab for the Initial diagnosis

* Portable imaging device
  * good quality B mode for vein access, tumescence anesthesia, distance measurements, color flow imaging during the procedure
Superficial, deep and perforator veins in both a supine and upright or standing position

* Color doppler, pulsed – wave doppler with a linear 7,5-10MHz transducer

* Venous reflux definition: antegrade flow, followed by retrograde in the same vein after muscle compression and Valsava maneuver
* Incompetence of the deep system, defined as veins having a maximum vein diameter $>3.5\ mm$ with reflux $>1\ s$.

* For superficial and perforator veins, incompetence is defined as having a maximum vein diameter $>3.5\ mm$ with reflux $>0.5\ s$.

* Deep venous or perforator pulsatility is an additional abnormal finding, indicative of either fluid overload or abnormal reflux.

* **SVS – AVF Guidelines for treating lower extremity venous disease**
Preoperative assessment

* DVU is mandatory additional to C.A. to document
  * Evidence of SFJ/SPJ/GSV / SSV reflux
  * Severity of the reflux
  * Extent of the reflux
  * Presence of large anterior – lateral branch at the SFJ
  * Duplicate vein systems
  * Anatomic variations
  * Diameter and size of proximal – mid and distal GSV/SSV
  * Patency of the deep vein system – insufficiency – chronic changes indicate prior DVT
  * Reflux from perforating veins

*Experienced DVU Vascular Specialist for Reflux assessment
Examination table

The treating physician is recommended to perform his or her own ultrasound as well as marking the veins to be treated.

Explain to the patient DU during endovenous procedures
DU during endovenous procedures

* Reverse Trendelenburg position
* Imaging – scanning the whole veins, noting the size and relationship with the saphenous fascia*
* Selection of access site and sheath placement
* Guide the needle and sheath placement
* Transversely or axially 22 gauge needle, 45 degree to the skin
* Local anesthesia to the skin and fascia
* Guide wire imaged with DU
* Sheath placement over the wire
DU during endovenous procedures

* Placement of the catheter near the vein junction (SFJ – SPJ)
* Precise position of the catheter using the transverse or axial view, 2-3 cm from the junction.
* Longitudinal view: tip of the catheter to the junction & exact measurement
* For tumescence anesthesia for thermal treatment
DU Guided tumescence of Truncal Veins

- Patient in Trendelenburg position
- Begins at the site of the access sheath
  - Transducer in a transverse position
  - Needle visualized as it hits the catheter
  - Tumescent solution is injected along the vein and the catheter
  - Repeat to the next segment of vein
  - Axial view proximally to check for adequate volume around the vein and that the vein above the catheter has been collapsed
  - Always check the tip of the catheter before completing tumescent in Trendelenburg position
DU during confirmation of successful truncal vein ablation

- DU is not required during thermal ablation for visualization of the catheter
- Recommended for non-thermal methods (observed the wire, foam or glue during treatment)
- Apply local pressure during treatment with the probe
- Check the proximal deep veins when the treatment is completed
Role of DU in perforator vein ablation

* As Important for needle, sheath, catheter guidance as it is with truncal vein ablations
* Is mandatory for accurate identification of the junction of the perforator vein, before it branches or bifurcates with the leg fascia # risk of DVT, Tibial nerve injury
* To control the tip of the catheter boiling during treatment
Post–procedure DU after ablation

* Confirmation of Successful Ablation Following Endovenous procedures
* Evaluation of Potential complications following endovenous ablation
  * Thrombus extension into the deep vein system (Endovenous Heat – Induced Thrombosis @ EHIT)
  * Hematomas
  * Superficial thrombophlebitis
  * A-V Fistula
Laser
Conclusions

* What is the role?
  * CRITICAL - MANDATORY

* Why?
  * All steps of endovenous procedures
    * Pre-op evaluation
    * During all endovenous procedures
  * DUS must be part of the training for vascular surgeons and be learned by any clinician who performs endovenous procedures
  * Is required in some patients to confirm the successful ablation following procedures and to evaluate patients for complication
Thank you